

<p>94-160888/20 D25 E14 INST FRANCAIS DU PETROLE 92.10.28 92FR-013080 (94.04.29) C07C 15/107, 2/68 Prodn of phenyl-alkane(s) - by using catalyst based on modified zeolite Y C94-073641 Addnl. Data: JOLY J, BOITIAUX J</p>	<p>INST 92.10.28 *FR 2697246-A1 D(11-A1B1, 11-D6) E(10-J2B3) N(6-B)</p>
<p>The simultaneous prodn. of 2-, 3-, 4-, 5- and 6-phenyl alkanes is effected by the alkylation of benzene using a 9-16C linear olefin in the presence of a solid zeolite catalyst. The catalyst comprises a matrix and a de-aluminised HY zeolite contg. hardly any extra-cellular Al, and having a Na content less than 0.25%, a cell parameter less than 24.55×10^{-10} m; and a BET surface area greater than 300 m²/g. The process is carried out at 1-10 MPa and a temp. less than 300°C, spatial velocity of 0.5-50 and a benzene: olefin(s) molar ratio of 1-20. <u>USE</u> The phenyl-alkanes obtained are used in the form-</p>	<p>ulation (after sulphonation) of bio-degradable detergents. <u>ADVANTAGES</u> The present invention overcomes safety and disposal problems which are incurred in the usual techniques using HF- and AlCl₃-based catalyst. The latter techniques also involve difficulties in sepn. of catalyst from the reaction prods. The new catalyst are very active and resistant to de-activation, and they give selectivities similar to those obtd. in classical processes. <u>OLEFIN REACTANT</u> 10-14C linear olefins are pref'd. <u>PREFERRED CATALYST</u> The matrix is chosen from a clay, alumina, silica, magnesia, zirconia, oxides of titanium and boron, or a combination. The Si:Al ratio is 8-70 (more pref. 15-25). The zeolite content of the catalyst is 20-98% (more pref. 40-98%).</p>

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The cell parameter is between 24.39×10^{-10} m to 24.21×10^{-10} m, and the surface area is more than 450 m²/g.

PREFERRED CONDITIONS

The prod. obtd. from the alkylation zone is fractionated into:

- (a) a first fraction contg. unconverted benzene,
- (b) a second fraction contg. at least one un-converted linear olefin;
- (c) a third fraction contg. phenyl-alkanes; and
- (d) a fourth fraction contg. at least one poly-alkyl benzene, which is re-cycled to the alkylation reactor.

Pref. at least part of the first and second fractions is recycled to the reactor zone.

EXAMPLE

A catalyst was prepared using as prim. material a zeolite NaY of formula $\text{NaAlO}_2(\text{SiO}_2)_{2.5}$, which had the following characteristics: global Si:Al atomic ratio = 2.5; crystal parameter (a_0) = 24.69×10^{-10} m; water vapour adsorption capacity (25°C) = 26%; surface area 880 m²/g.

This was subjected to 5 exchanges with 2M NH_4NO_3 soln. at 95°C for 1.5 hr. to give a zeolite NH_4Y contg. 0.95% Na. This was stabilised in an oven at 770°C for 4 hrs. and then subjected to an acid treatment with 3N. HNO_3

(9 cm³/g of solid) at 85°C for 3 hrs. followed by a similar treatment, but with 0.5N. HNO_3 .

The zeolite obtd. contain 0.2% Na, had an Si:Al global atomic ratio of 28, crystalline parameter (a_0) equal to 24.24×10^{-10} m, surface area 770 m²/g, and water absorption capacity of 5%. It was formed into extrudates with 20% of alumina and calcined at 550°C. This was designated catalyst (B).

A similar catalyst (but not conforming to the invention) was prepared from mordenite zeolite (catalyst A).

The 2 catalysts were tested in the alkylation of benzene by 1-dodecene at 50°C, 4 MPa, LHSV 3 x vol. of catalyst, and benzene to 1-dodecene ratio of 5.5. The results are as follows:

<u>Charge compsn. (%wt)</u>	<u>Catalyst A</u>	<u>Catalyst B</u>
Benzene	71.7	72.3
1-dodecene	28.3	27.7
<u>Prod. compsn. % wt.</u>		
2-phenylalkane	77.34	26.92
3-phenylalkane	10.83	20

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4-phenylalkane	0.98	19
5-phenylalkane	0	11.5
6-phenylalkane	0	11.48
Di:dodecylbenzene	10.10	10
Heavy residue	0.75	1.1

From this it can be seen that only catalyst (B), contg. de-aluminised zeolite Y, gave a homogeneous distribution of phenyl-alkanes (similar to that generally obtd. with HF or AlCl₃ catalysts), whereas catalyst A gave mainly 2- and 3-phenylalkanes. (13pp2003EDDwgNo0/0)

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